

MARSHALL STAR

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Mighty Eagle Scores Longest, Highest Flight Yet

By Shannon Ridinger

The "Mighty Eagle," a NASA robotic prototype lander, reached its highest altitude and velocity -- and longest duration -- on Oct. 25 when it soared to a height of more than 150 feet during a flight that lasted about 45 seconds.

Image right: The "Mighty Eagle," a NASA robotic prototype lander, soared to an altitude of more than 150 feet during a 45-second flight Oct. 25. (NASA/MSFC/Dennis Olive)

"We are very proud of this safe, successful flight," said Dr. Greg Chavers, test lead for the project. "The vehicle flew to a record height, and proved that it could handle the increased altitude and flight duration."

Previously, the "Mighty Eagle's" highest flight was 100 feet, with a flight duration of about 35 seconds.

"We are really excited," added Patrick O'Leary, one of the test engineers for the project. "When I first started working on this



project four years ago, our first vehicle -- called the Cold Gas Test Article -- could only do 10 feet for about 10 seconds. We've come a long way with the 'Mighty Eagle'."

O'Leary says the increased height and flight duration means that the vehicle could be used for different applications including testing sensors and other equipment that require higher altitudes and longer durations in the air.

"It really increases our capabilities for testing," said O'Leary. "To get to the increased height, we had to increase the speed of the vehicle, and today's test proved that we could do that successfully."

The "Mighty Eagle," nicknamed after one of the characters in the popular "Angry Birds" game, is a three-legged prototype vehicle that resembled an actual flight lander design. It is 4 feet tall and 8 feet in diameter, and weighs about 700 pounds when fueled. It is a green vehicle, fueled by 90 percent pure hydrogen peroxide, and is guided by an onboard computer that activates the thrusters to power the craft's movements.

NASA will use the "Mighty Eagle" to mature the technology needed to develop a new generation of small, smart, versatile robotic landers capable of achieving scientific and exploration goals on the surface of the moon, asteroids or other airless bodies.

The "Mighty Eagle" was developed by the Marshall Space Flight Center and Johns Hopkins University Applied Physics Laboratory in Laurel, Md., for NASA Headquarter's Planetary Sciences Division, Science Mission Directorate. Key partners in this project include the Von Braun Center for Science and Innovation, which includes the Science Applications International Corporation, Dynetics Corp., and Teledyne Brown Engineering Inc., all of Huntsville.

For more information on NASA's robotic landers, visit:

http://www.nasa.gov/mission_pages/lunarquest/robotic/index.html

Ridinger is a public affairs officer in the Office of Strategic Analysis & Communications.

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Director's Corner



Patrick Scheuermann (NASA/MSFC)

At Marshall and NASA centers across the country, we take pride in problem-solving and research, but also in our flexibility and efficiency.

If you usually come to work the Friday after Thanksgiving, you probably find yourself in a mostly empty building. Based just on Civil Servant records last year, only about 22 percent of employees report to work that day.

To make better use of facilities, this year we're going to test a flexible working site system that builds on best practices from around NASA, the federal government and businesses. The Center will partially or entirely close most buildings on Nov. 23 for Flexible Worksite Day by placing them in "weekend mode" (no HVAC).

This means employees who work on Nov. 23 will report to an "alternate worksite" if their building is not open for business.

There are several reasons to try this. The primary one is to test the Agency's "work from anywhere" policy and the Center's

telework capability in a controlled situation.

Trying this approach on a planned, organized, small scale will help the Center learn how to adapt it for wider use – especially in emergencies.

Another is to confirm the lessons we learned after the April 2011 tornadoes knocked out power, forcing many of our employees to work from home or alternate worksites.

The Thanksgiving test will demonstrate whether we have enough IT support for wide use.

We will also offer selected training, such as IIF, to employees whose buildings will be closed.

There will be designated alternate worksites for employees who will be working and whose building will not be open, but not telework. People who need laptops for the day will have them assigned on a temporary basis. Building 4600 will be the centralized alternate workspace.

Mission Essential operations will continue as on a normal weekend. We believe this to be a good test of our ability to adapt when the need arises.

Buildings open on Nov. 23 Flexible Worksite Day:

- 4203
- 4207
- 4241
- 4249
- 4250
- 4312
- 4315
- 4483
- 4485
- 4487
- 4600
- 4607
- 4610
- 4619
- 4629
- 4631
- 4650
- 4654
- 4659
- 4663
- 4711
- 4723
- 4727

Alternate worksites for employees will be coordinated with your supervisor.

- Cafeteria operations will be closed the day after Thanksgiving, providing good workspace for those with laptops.
- Employees should not forward desk phones to an external number. Desk phones should be set up to go to a voicemail message that employees can either check remotely, or employees can change their voicemail to provide callers with an email address or government cell phone number for immediate assistance.

- For technical support, call 256-544-HELP, email nasa-esd@mail.nasa.gov or see <https://esd.nasa.gov>.

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Post-Audit Results from Associate Director, Management, Robin Henderson

MSFC has just completed its triennial audit for registration to AS9100 and ISO 9001 Quality Management System standards. The audit was performed by three auditors from National Quality Assurance, USA (NQA).

MSFC has been recommended for continued registration to ISO 9001:2008 and AS9100:2009. Once the one minor nonconformance that was issued is closed, our registration certificate will be re-issued.

The numbers of ISO 9001/AS9100 findings are as follows:

Major Non-Conformances: 0

Minor Non-Conformances: 1

Observations: 2

Thanks to everyone for the part they played in the audit. Thanks for your efforts to get yourself personally prepared.

Robin Henderson

Associate Director, Management

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Scheuermann Holds All-Hands at Michoud Assembly Facility

Marshall Space Flight Center Director Patrick Scheuermann speaks to Michoud Assembly Facility employees during an all-hands meeting at the facility Oct. 23. Scheuermann emphasized how Michoud is critical to the Space Launch System program and will deliver safe, reliable SLS components. The Marshall Center manages the SLS Program for the agency and is working closely with its partners at the Orion program office managed by NASA's Johnson Space Flight Center and the Ground Systems Development and Operations Program, which manage the operations and launch facilities at NASA's Kennedy Space Center. (NASA/MAF)



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'SLS Industry Day at MAF' All About Progress



Todd May, Space Launch System Program manager, updates the progress of the rocket program to business representatives during "SLS Industry Day at MAF" on Oct. 24 at the Michoud Assembly Facility. More than 170 people attended, representing 90 companies across 19 states. Other NASA personnel pictured here giving SLS updates included Chris Crumbly, SLS Advanced Development manager; Mike Kynard, SLS Engines manager; and Tony Lavoie, SLS Stages manager. Attendees also got an overview of MAF capabilities and construction of facilities, SLS acquisition, the Orion spacecraft, Marshall Space Flight Center partnerships and Stennis

Space Center capabilities. With 43 acres under one roof, the Michoud facility has a rich history in spaceflight manufacturing, from the Saturn V to the external tanks of the Space Shuttle Program. The Michoud workforce begins the next chapter of human spaceflight support by building the Orion composites and the Core stage of the Space Launch System. The SLS Program and the Michoud Assembly Facility are managed at the Marshall Space Flight Center. (NASA/MAF)

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Getting Closer to the Goal

The Marshall Center's 2012 Combined Federal Campaign runs through Dec. 15. So far, Marshall's work force has contributed \$172,328 toward the center's \$700,000 goal.



CFC Volunteers Help Special Olympics Athletes Go for the Gold



On Oct. 23, more than 75 Marshall Space Flight Center team members volunteered at the Special Olympics, part of the Combined Federal Campaign's Community Service Days. The event, held at Milton Frank Stadium in Huntsville, provides year-round sports training and athletic competition in a variety of Olympic-type sports for children and adults with intellectual disabilities. Arthur Patrick, left, an environmental engineer in Marshall's Office of Center Operations, with his daughter, Abigail, participate in the 25-meter wheelchair race. (NASA/MSFC/Fred Deaton)

Angelia Walker, a systems engineering and integration division chief in Marshall's Engineering Directorate, gives one Special Olympics athlete the star treatment with a manicure. To make a CFC donation to the Special Olympics or other charitable organizations, visit [here](#). (NASA/MSFC/Ray Downward)





Debbie Allen, center in background, a human resources specialist in Marshall's Human Resources Services Office, cheers on a Special Olympics athlete as she -- with support from her family -- makes her way around the track. Marshall team members may view a photo gallery from the Special Olympics [here](#). (NASA/MSFC/Fred Deaton) .

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The Face of Mission Success at Marshall is: David Brock Small Business Specialist in the Marshall Space Flight Center's Small Business Office

Image right: David Brock (NASA/MSFC/Fred Deaton)

- **Organization:** Office of Procurement
- **Years at Marshall:** Almost 28 years
- **Education:** Certificate in business, Gadsden Business College, 1973; associate's degree in science, Snead State Junior College, 1980; bachelor's degree in business with minor in marketing, University of Alabama in Birmingham, 1983.



- **Responsibilities:** As the small business specialist, my primary responsibility is the planning, coordination and implementation of the NASA small business programs at Marshall. In doing so, I establish center biannual small business goals; review/monitor prime contractor subcontracting programs; represent NASA/Marshall at special outreach events and workshops; provide industry counseling to small businesses; ensure that small businesses receive, to the maximum extent possible, opportunities to participate in all Marshall acquisitions; serve as advisor to all Source Evaluation Boards and committees on matters pertaining to small business; and serve as liaison between the U.S. Small Business Administration and Marshall. Innovative technologies are developed through extensive interaction with Marshall procurement and technical personnel, and the small and large business communities, for example, small business technical coordinators who serve as liaisons to the small business specialists across all Marshall organizations; the Marshall Prime Contractor Supplier Council, consisting of more than 100 members representing 50 large businesses; and the Small Business Executive Leadership Team, consisting of representatives from approximately 30 small businesses currently provided direct support to Marshall. These organizations and groups serve as valuable resources to the Marshall Small Business Office in the creation of innovative ways to more effectively affect program implementation at the center.
- **How does your work at Marshall support the agency's goals?** It is my objective to help the NASA Office of Small

Business Programs to promote and integrate all small businesses into the competitive base of contractors that pioneer the future of space exploration, scientific discoveries and aeronautic research by developing small businesses in high-technology areas that include technology transfer and commercialization of technologies. We also work to provide small businesses maximum practical opportunities to participate in NASA prime contracts and subcontracts.

- **Have you found any unique, cost-saving or collaborative processes or innovations in the last year?** The establishment of small business technical coordinators is a Marshall advocacy tool created in the late 1990s -- reactivated in FY2012 -- that has been adopted by the agency as a tool to be implemented across all NASA centers this year. I've also worked closely with other NASA small business specialists to help them better define the tools and resources needed to advance their small business programs in a positive direction, and I serve as one of several senior subject matter experts on program implementation for the agency. The Marshall Prime Contractor Supplier Council and the Small Business Executive Leadership Team are other collaborative tools that have been implemented over the years to assist in program implementation at Marshall. Like the coordinators, these models have also been adopted as agency models for other NASA centers to implement.
- **What do you hope to accomplish in your role over the next fiscal year?** I hope to continue growing the program both in numbers and quality of high-tech suppliers supporting the center. I also hope to expand the base of advocacy support across all Marshall organizations and the prime contractor community by creating opportunities for those interested to learn more about the programs and the role they can play in overall program implementation.
- **What is the biggest challenge you face?** The biggest challenge to advancing the interest of the programs at Marshall is staying abreast of the numerous changes in small business legislation, and learning to affect implementation in a positive way amidst the many budget constraints facing the federal government today.
- **Do you partner outside your org/outside Marshall on your work? What, in your mind, exemplifies Marshall's value as a business partner?** Yes, we continuously seek ways to affect program implementation by partnering with other organizations. We have and will continue to work closely with our Team Redstone partners and the city of Huntsville -- for example, the Missile Defense Agency, Huntsville/Madison County Chamber of Commerce, and the U.S. Army Aviation and Missile Command -- to promote the goals and objectives of the Federal Government Small Business Programs in the Huntsville marketplace. We believe Marshall has much to offer in the way of proven best practices and lessons learned. Twice in the past three fiscal years, the center's Small Business Office received honors by being presented the first-ever "Administrator's Cup Award" for having the best program in NASA in 2008. We were honored with this award again in 2010. By working together, we can achieve much more in the way of advancing the programs.
- **On the personal side, how do you like to spend your leisure time?** I am an avid reader, enjoying books on business and commerce, motivation, etc., by such notable authors as Zig Ziglar, Dale Carnegie and Dr. Norman Vincent Peale. I also enjoy reading about people and places. I serve as lay speaker at the Julia Street United Methodist Church in Boaz, teach an adult Sunday school class and serve as chair of our church council. For more than 15 years, I have served on the Alabama Department of Rehabilitation Services Board of Governors, a position first appointed by Gov. Jim Folsom Jr. for three years, Gov. Fob James for five years and then by Gov. Don Siegelman for seven years. I am also finishing up my first book on my life journey. I hope to have it published by the beginning of next year.
- **What is something people would be surprised to find out about you?** Many probably already know, but for those who don't, I was diagnosed with a hereditary eye disease known as Retinitis Pigmentosa in 1973, a disease that gradually robbed me of my eyesight. Since joining the center in 1984, I have had to perform my job duties without the use of my sight. It has been a challenge, but the journey has been incredible.
- **What is your favorite memory at Marshall?** My selection as the NASA Small Business Specialist of the Year in 1992, the first-ever such award given at NASA. I've since won this award on four other occasions, but the first award really had meaning in that I had proven that although having to perform the work at somewhat of a disadvantage with the lack of eyesight, a person could still excel -- despite the barriers -- so long as one stays focused, works hard, shows initiative and pays attention to detail.
- **Who is someone you admire and why?** Dr. Wernher von Braun is my hero. What an incredible person and life he lived in pursuit of his dreams. It was a dream come true for me to have the opportunity to work at the center where Dr. von Braun and his team changed the course of history with the development of the powerful Saturn rockets that would

FOXSI: A Next-Generation X-Ray Telescope Gets Ready to Fly

Combined Reports



At the beginning of November, a NASA mission called Focusing Optics X-ray Solar Imager, or FOXSI, will launch from White Sands, N.M., to study smaller, barely visible events of the sun called nanoflares. To do so, it will make use of a state-of-the-art X-ray telescope built at the Marshall Space Flight Center. This next-generation telescope will be able to focus incoming, high-energy X-rays from the sun in a way that has never before been possible for solar observations.

Image left: FOXSI will apply focusing optics developed for astrophysical observations to solar observations. A major goal of the FOXSI program is to push these developing technologies to the unique requirements of solar observations. The FOXSI instrument,

shown above, is composed of seven grazing-incidence telescope modules, each with seven nested shells. FOXSI is a sounding rocket program funded by the NASA Low Cost Access to Space (LCAS) program. The Marshall Center developed the optics. (NASA)

"Most people like to look at the really big flares. They're complicated and do crazy things," said Steven Christe, project scientist for FOXSI and a solar scientist at the Goddard Space Flight Center. "However, FOXSI is geared to look at very, very faint events."

FOXSI is targeted to launch no earlier than Nov. 1 on board what is known as a sounding rocket, which takes short trips some 200 miles up and gathers as much data as possible in about six minutes.

During that time, FOXSI will first look at an active region on the sun, with its characteristic flares or loops, and then switch its gaze to a quieter region to observe an undiluted patch of smaller flares. Since the nanoflares happen constantly, Christe points out that the sounding rocket need not wait for a special time frame to launch -- an advantage when it comes to finding an acceptable launch window.

However, viewing such faint events requires extra-sensitive optics. That is where the telescope -- built at Marshall -- comes into play.

Previously, techniques to collect and observe the X-rays streaming from the sun at high energies were hampered by the fact that X-rays cannot be focused with conventional lenses the way visible light can be. When an X-ray encounters a standard glass lens, it passes through the lens completely. High-energy X-ray telescopes have therefore relied on indirect ways of measuring the X-rays present. This is a very effective technique when looking at a single bright event on the sun, such as the large burst of radiation and X-rays from a solar flare, but doesn't work as well when searching for many faint events occurring simultaneously.

The FOXSI instrument, however, makes use of new iridium-coated nickel/cobalt mirrors that do successfully cause high-energy X-rays to reflect -- as long as the X-rays come in from a nearly horizontal direction. Several of these mirrors in combination help collate the X-ray light before funneling it to the detector, making faint events appear brighter and crisper.

Another advance for the telescope comes in the very building of the optics system. In general, better optics require more accurate mirrors, which in turn requires labor- and money-intensive polishing to get a flawless finish. The FOXSI mirrors use a replication technique whereby a surface is perfectly polished once, and mirrors are created off of that surface by nickel-plating it. This process can be repeated multiple times -- saving time and money.

The FOXSI mirrors were built at the Marshall Center, in collaboration between the Science and Technology Astrophysics Office and Marshall's Sensors, Imaging and Optics Branch, with support from Jacobs Technology in Huntsville.

"We have been building this type of X-ray optic for some time, but these were particularly challenging, given the science requirements and the launch environment," said Brian Ramsey, principal investigator for FOXSI optics. The individual mirrors have to be very lightweight, just 10-thousandths-of an-inch thick, with precise shapes to give high resolution, but they must survive the punishing G-forces when the rocket ignites. We had to do extensive modeling and testing," explained Ramsey, "but we eventually got it figured out."

By using such optics on the sounding rocket, Christe hopes they'll be able to perfect their performance for use on a sun-observing satellite some day. This is another benefit of sounding rockets: Testing innovative technology on a less expensive rocket sets the instruments up for potential deployment on a permanent spacecraft. Instruments, like those on FOXSI, will be important to nail down the mystery of what causes these small flares and what they in turn affect.

"There are two basic possibilities," said Christe. "One is that small flares are similar to large flares. But then we'd have to explain why they appear at a different rate and in different places than the big ones. So, we need to determine whether these small events are really happening all the time, all over the sun. The other possibility is that they are fundamentally different than large flares, and that would be extremely interesting and would point to a difference in the physics that powers large versus small flares."

Another question to solve is whether all those tiny flares add up to enough energy shooting into the sun's corona to heat it to the temperatures of more than one-million degrees Kelvin. Just what heats the corona is part of what's known as the "coronal heating problem" -- a question of how it gets so much hotter than the sun's surface, which is a mere 6,000 degrees Kelvin.

Answering such large questions will not be solved by a single rocket launch, but FOXSI's data will provide new insights into the X-ray portion of the sun's spectrum, filling in yet another piece of the puzzle while also paving the way for future sun-observing technology.

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Marshall Team Invited to American Indian Heritage Month Program Nov. 6

Team Redstone -- which includes the Marshall Space Flight Center and U.S. Army organizations on Redstone Arsenal -- will commemorate American Indian Heritage Month with a special program Nov. 6. The event will be held at 1 p.m. at Bob Jones Auditorium, Sparkman Center, Building 5304. All Marshall Center team members are encouraged to attend.

This year's theme is "Serving Our People, Serving Our Nations: Native Visions for Future Generations." The keynote speaker will be Neal Powless, a member of the Onondaga Eel Clan and assistant director of the Native Student Program at Syracuse University in New York. Powless also played in four world championship tournaments on the Iroquois Nationals

lacrosse team. Marshall team members can read more about Powless on [ExplorNet](#).

Find this article at:

<http://www.nasa.gov/centers/marshall/about/star/index.html>